United States Department of Agriculture
Agricultural Marketing Service, Science & Technology
Pesticide Data Program

SOP No.: QC-8		Page 1 of 5
Title: Control Charting of Data		
Revision: Original	Replaces: N/A	Effective: 01/01/94

1. Purpose:

To provide guidelines for control charting of process controls and spike recoveries for the USDA/AMS Pesticide Data Program (PDP). Control charting is a graphical tool to conduct a continuing assessment of each laboratory's analytical systems. Control charting shall be used to evaluate the precision, accuracy and consistency of data produced in each participating laboratory, as well as to assist the laboratory in recognizing changes or trends in their analytical system. It allows the laboratory to evaluate when corrective action should be instituted and also to observe the results of corrective actions taken.

2. Scope:

This SOP shall be followed by all analytical laboratories which are conducting residue studies for the USDA/AMS-PDP project. This includes laboratories conducting stability and other studies which may impact the PDP program.

3. Definitions:

NWA-QA = Quality Analyst by Northwest Analytical, Inc.
X = Mean value control chart
R = Range Control Chart
S = Standard deviation control chart
I = Individual value control chart

4. Outline of Procedure:

6.1 Control Charting
6.2 Control Chart for Process Control Data
6.3 Control Chart for Spike Recovery Data
6.4 Interpretation and Review of Control Charts

5. References:

Quality Assurance of Chemical Measurements, Taylor, J. T., Lewis Publishers, 1989
Training Session with NWA-QA and subsequent USDA-State meeting on Control Charting, 11/17/92 in Manassas, VA

6. Specific Procedures:

6.1 Control Charting

Each laboratory shall use the Quality Analyst by Northwest Analytical, Inc. (NWA-QA) or an equivalent program for the preparation of the control charts. If an equivalent program is used, then the USDA/AMS Technical Director shall be notified in writing.

6.2 Control Chart for Process Control Data

a. The laboratories shall prepare statistical control charts of the process control data for each method of detection (e.g., ECD, ELCD, FPD, NPD, etc).

b. The data for the process controls shall be entered as "grouped" data to display the overall performance of a set of samples. A group represents the process controls associated with an individual sample set.

c. The control charts shall be calculated using a minimum of 20 sets of data.

d. Plot the X control chart. If you are using NWA-QA, you should also print out the R Chart to examine what is happening within your sample set. If the subgroup exceeds 12 data points, you can switch from an R chart to an S chart for more meaningful data.

e. As a minimum, data "columns" shall include Date, Chemical Class (e.g. OP), and mean values (e.g. n_1, n_2, ... n_n)

6.3 Control Chart for Spike Recovery Data

a. Laboratories shall prepare statistical control charts of the recovery data of the PDP marker pesticides.

b. The data for the spike recovery control charts shall be entered as individual data points (I) so that each point for a particular analyte can be plotted.

c. Each laboratory shall specify in its written procedures whether the control charts are calculated across all commodities, each commodity or commodity groupings as specified in the QC-7 attachment.

d. I charts (which will handle accuracy) shall be plotted for each analyte identified in 6.3.a. The plotting of R charts (which will handle precision) is optional.

6.4 Interpretation and Review of Data

a. For detailed information, refer both to the NWA-QA manuals and the discussions by John Taylor in the cited references.

b. Each laboratory shall establish criteria to define out of control situations in an internal SOP. As a minimim requirement, any value beyond the 3 standard deviation units, shall be investigated.

c. Each laboratory shall establish procedures and person(s) responsible for investigating and documenting out of control situations, and taking corrective action in an internal SOP.

d. All charts shall be printed and reviewed on a routine basis. Each laboratory shall specify in an internal SOP a time period (e.g., once a month) or a number of points collected (e.g., 20 data points) as the definition of "routine basis." Each laboratory shall also specify the person(s) responsible for printing and

reviewing the control charts.

e. Periodic review of the control charts shall include a determination of the mean and standard deviation. Significant differences shall be reflected in the control limits for the next set of charted data.

f. All charts shall be available to the laboratory personnel.

SOP No.: QC-8		Page 5 of 5
Title: Control Charting of Data		
Revision: Original	Replaces: N/A	Effective: 01/01/94

Martha Lamont *12/17/93*

Approved By: Martha Lamont Date
Technical Director, PDP

USDA/AMS
8700 Centreville Road, Suite. 200
Manassas, VA 22110
(703) 330-2300

Robert Epstein *12/21/93*

Approved By: Robert Epstein. Date
Program Administrative Director, PDP

USDA-AMS-SD
PO. Box 96456-3525
South Building
Washington, DC 20090-6456
(202) 720-2158